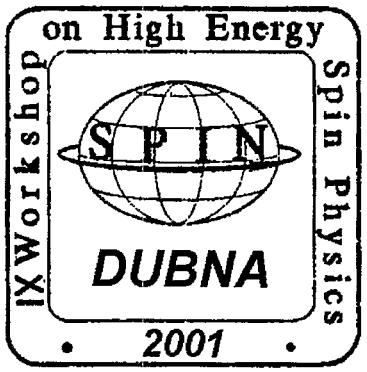


A.Efremov, JINR, Dubna
15th International Spin Physics Symposium
BNL, Sep. 9–14, 2002

SUMMARY OF IX-th WORKSHOP ON HIGH ENERGY SPIN PHYSICS

(Dubna, August 2-7, 2001) [1]

(Devoted to the memory of Prof. L.I. Lapidus)

Difficult theory

- Intimate and subtle properties of particle interaction

Difficult experiment

- Low temperatures
- Depolarizing resonances
- Effects are maximal where σ minimal

Always brings troubles

- 60-th: πN CEX — Regge cuts
- 1976: High p_T Λ polarization — Break of naive PM
- 1987: Famous "Spin Crisis"

[1] About 90 scientists from FSU states, Germany, Poland, USA, Japan, etc., (including 40 from JINR). Sponsored by RFBR, UNESCO, International organizing committee for spin symposia and JINR. Proceedings is on (JINR E1,2-2002-103) and mailing to all participants.

Lev Iosifovich Lapidus (1927–1986)

Famous physicist-theorist

Deputy-director of Laboratory of Nuclear Physics of JINR

Great enthusiast of spin physics

Founder of Workshops on High-Energy Spin Physics

Nucleon longitudinal spin structure

D.Stamenov (Sofia)

- New QCD analysis of world DIS data. $\Delta G/G \approx 0.2$ in $x \approx 0.1$ with $SU(3)_f$

M.Praszalowicz (Cracow)

- Depends however of $SU(3)_f$ breaking. (Large error in Ξ decay.)

J.Pretz (Bonn)

A.Bravar (BNL)

- Direct measurement of ΔG is main goal of future experiments (COMPASS, RHIC)
  - $c\bar{c}$ production in $\gamma^* g$-fusion
  - Large p_T hadrons (jets)
    (Higher statistics but bigger systematics)
    First probe of HERMES gives $\Delta G/G \approx 0.45$ in $x \approx 0.1$.
    Now measurements in J/ψ-production are planed.

A.Tkabladze (Zeuthen)

K.Kowalik (Warsaw)

  - New interesting method of the PGF events selection using neural network.
    Increase efficiency but (in my view) needs a control.

A.Bravar

  - Direct γ and W production at RHIC.

A.Kotikov (Dubna)

- A new approach to Q^2-dependence of A_1 taking into account.

K.Christova (Sofia)

- A new strategy for extraction of PDF& PFF (based on interplay of SIDIS and e^+e^- annihilation.)

M.Polyakov (Bochum)

- "Sea" quarks spin contribution.
  $\Delta\widetilde{u} = \Delta\widetilde{d}$ contradicts to Pauli blocking.
  $\Delta\widetilde{u} = -\Delta\widetilde{d}$ more natural. (Chiral models, $N_C \to \infty$)

Nucleon transversity distribution, $h_1(x)$

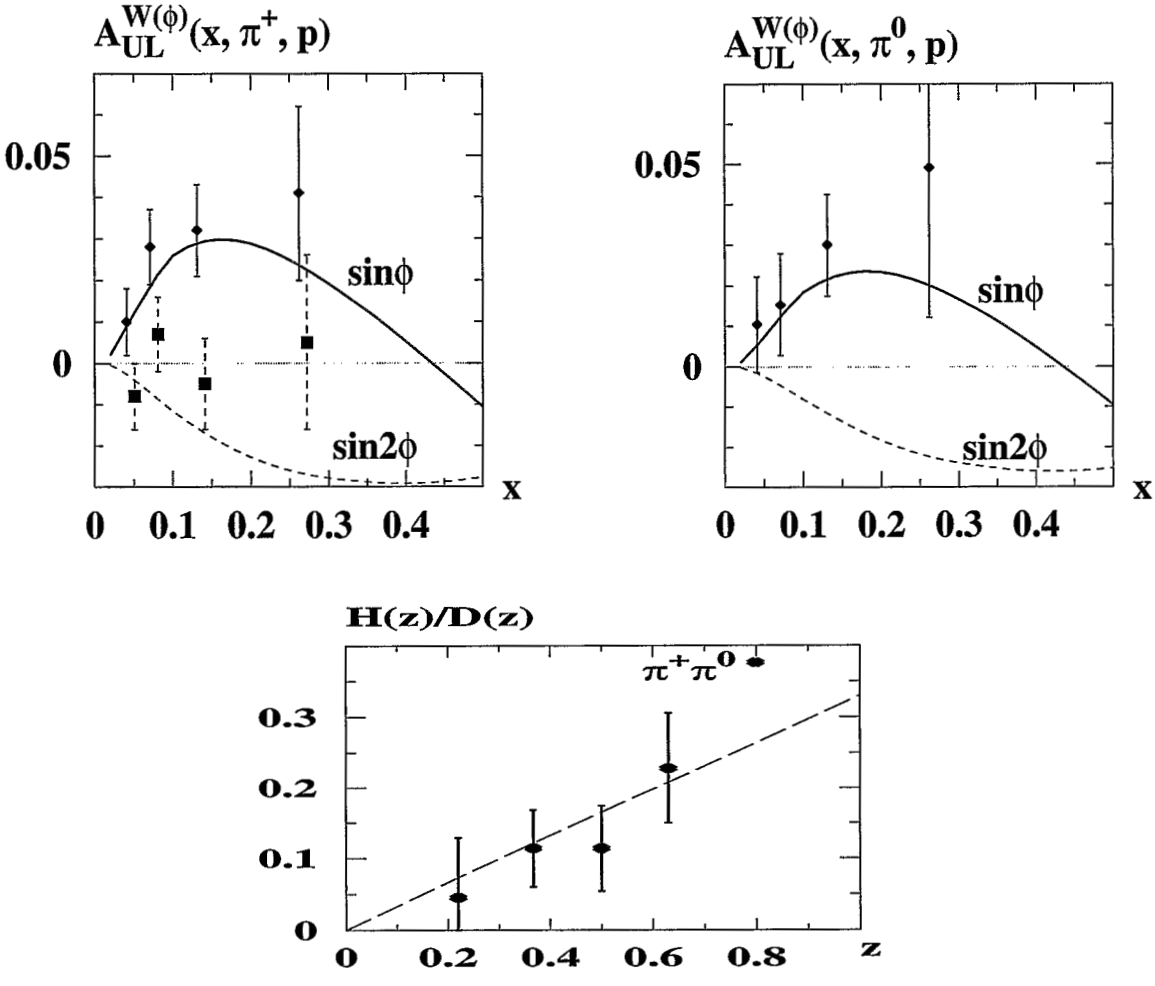
- One of three main characteristics of quark density matrix
  - χ-odd, difficult for measurements
  - A_{TT} in Drell-Yan or "Collins PFF" $H_1^\perp \equiv \Delta^T D$ in SIDIS

K.Oganessian (Yerevan)

- First measurements of spin asymmetries in SIDIS by HERMES

- Extraction of $h_1(x)$ from the HERMES data (using DELPHI result $\left\langle \left| \frac{H_1^\perp}{D_1} \right| \right\rangle = 12.5 \pm 1.4\%$)
  $h_1(x)$ close to quark soliton χ-model prediction

A.Efremov (Dubna)

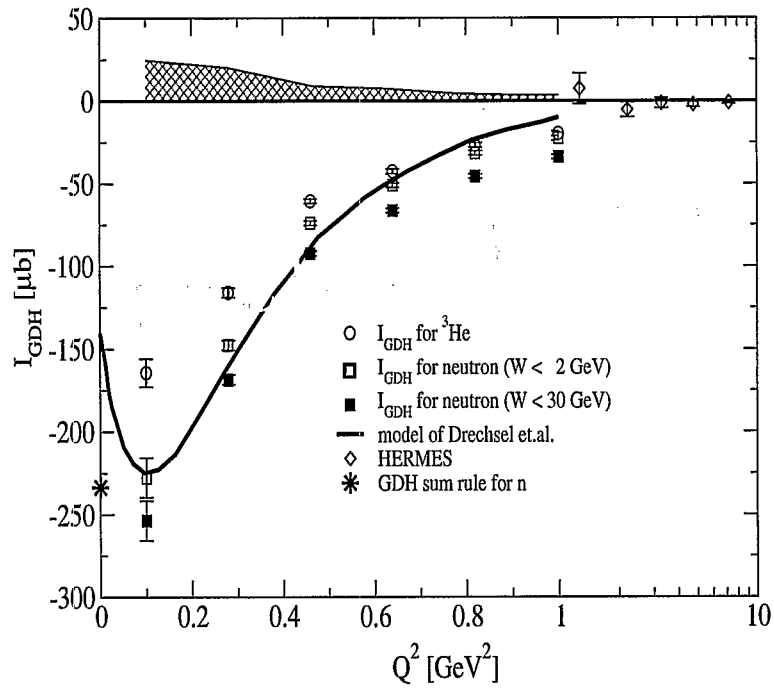


Check of GDH SR [2]

- Where and how change of sign takes place?
- Ioffe-Leader — $Q_0 \approx m_\rho$
- Soffer-Teryaev — $Q_0 \approx m_\pi$
- JLab show a low intercept $Q_0^2 \approx 0.25\,GeV^2$

P.Zolnerczuk (JLab)

- New data of JLab for neutron (^3He) target up to $Q^2 \approx 01\,CeV^2$



K.Helbing
I.Preobrazhenski
A.Nagaytsev

- New experiments on GDH SR at ELSA , MAM and HERMES.

[2]**The first approach to the sum rule for the nucleon magnetic moment was invented in the paper L.I. Lapidus, Chou Kuang-chao,"On scattering of γ-quanta by nucleon", JETP 41, 1546 (1961). So it would be more correct to baptize it as LCGDH.**

Generalized PDF and Fracture Function

- A new field of QCD application
  - Unify the usual PDF and light-front wave functions (i.e. inclusive and exclusive processes),
  - Contain information on parton orbital angular momentum contribution,
  - Could be measured in DVCS and meson electroproduction (ρ or π)

A.Borissov (AnnArbor)
J.Ely (Boulder)
E.Thomas (Frascati)

- First probe of DVCS at HERMES were presented

$$A_{UL}^{\sin\phi} = -0.18 \pm 0.05 \pm 0.01 \qquad e^+\vec{p} \to e^+\pi^+ n$$

$$A_{LU}^{\sin\phi} = -0.23 \pm 0.04 \pm 0.03 \qquad \vec{e^+}p \to e^+\gamma X$$

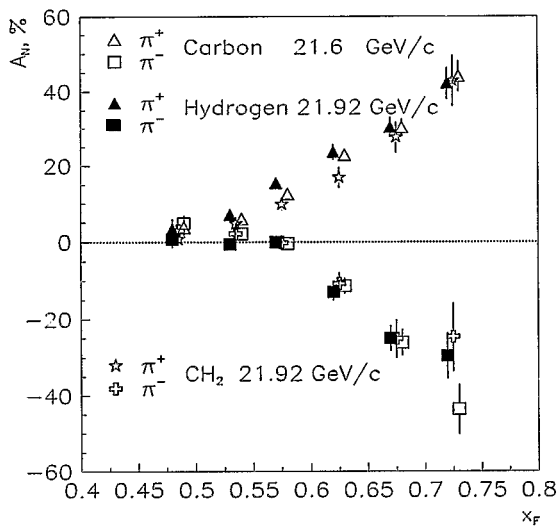
A.Schaefer (Regensburg)
B.Postler (Wuppertal)
O.Teryaev
I.Anikin (Dubna)

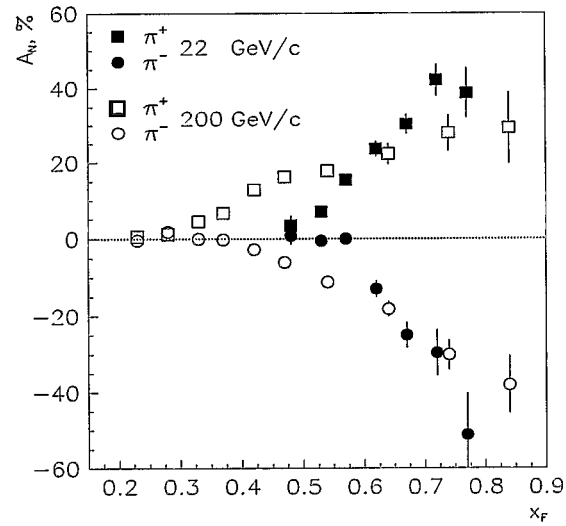
- New development of the theory of these processes was discussed

SSA in hadron processes

S.Nurushev (IHEP)

- New data on pions left-right asymmetry at 22 GeV (AGS) on carbon target.





– Same A for ^{12}C and H targets,

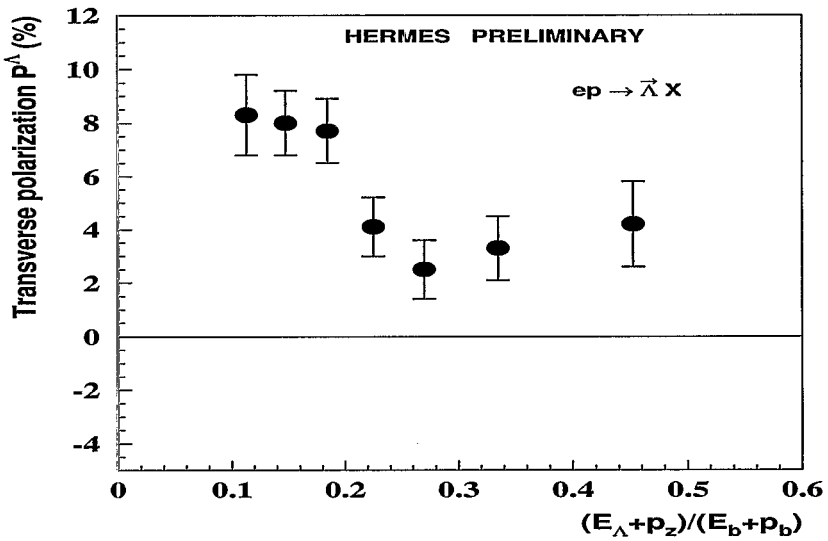
– Almost same as at 200 GeV

A.Bogdanov (MEPhI)

– Could be used for polarimetry

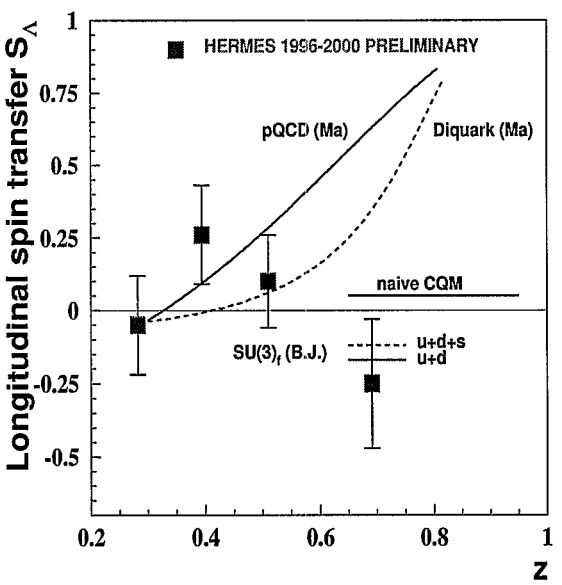
O.Grebenyuk (PNPI)

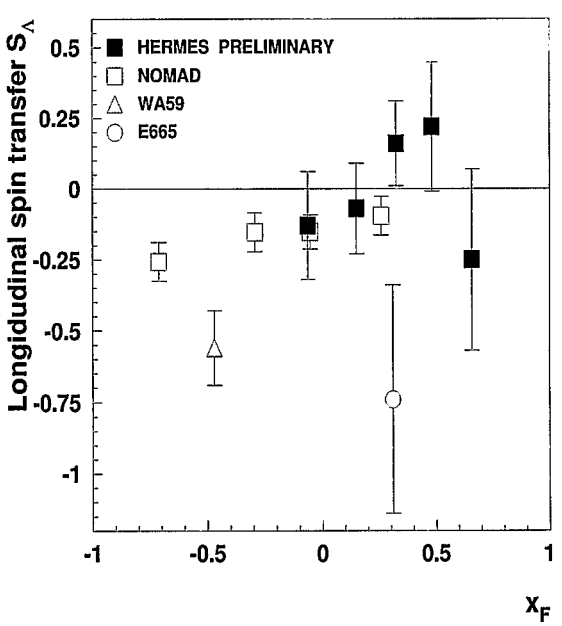
- One more puzzle transverse Λ polarization! Strong enough but positive (opposite to hadron processes)



S.Belostotski (PNPI)

- Longitudinal spin transfer to Λ in $x_F > 0$ at HERMES. (Better statistics and MC-simulation is needed to distinguish between various models.)

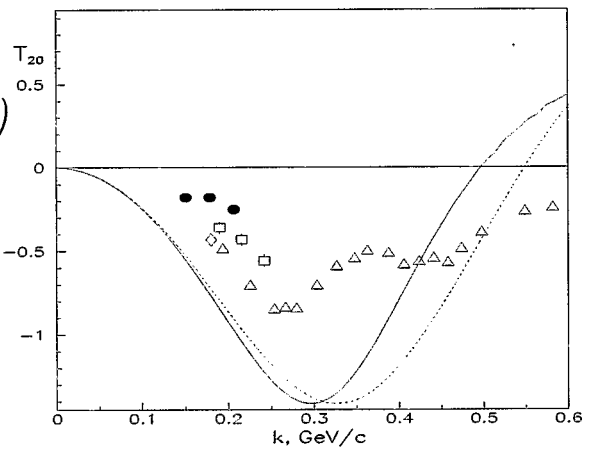


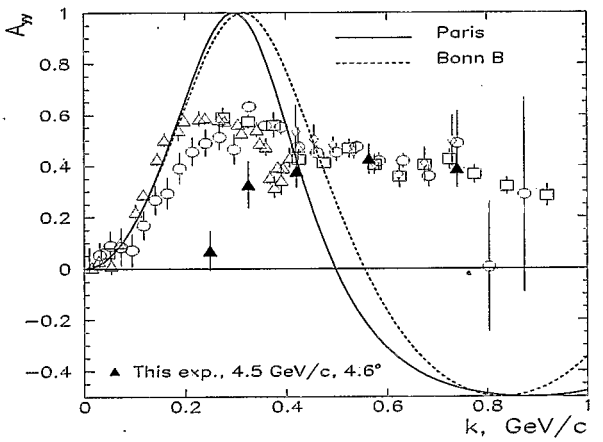


Intermediate energy spin physics

L.Azhgirey
N.Piskunov
V.Ladygin
V.Sharov
(Dubna)
V.Sumachev
(PNPI)
D.Toporkov
(Novosibirsk)
T.Uesaka
(Saitama)

- Different polarized beams, targets and centers.
- As a rule, spin observable on nuclei (T_{20}, κ, $\Delta\sigma$ A_y, A_{yy} etc.) do not follow the standard approach to nuclei





K.Hatanaka
(Osaka)
H.Sakai
(Tokyo)
Illarionov
Lykasov
(Dubna)

- Some new elements (3-body forces, multi-quarks etc.) are required.
- Significant place was given to technics (target, sources, polarimetry, etc.).

M.Galinski
(Minsk)
A.Potylitsyn
(Tomsk)

- Polarization of e^+ and e^- by a laser beam.
- Accelerating of polarized deuterons at Nuclotron (JINR, Dubna). Would allow JINR to preserve noticeable place in the spin physics

Yu.Pilipenko
(Dubna)

X-th Dubna-Spin Workshop is planned in 2003